Bellringer

→ What are the molecules? 4 major biological
Proteins Carbohydrates
Lipids N. A.

→ What is DNA?
Deoxyribose

Lipids → Oils + Fats
Carbohydrate → $C_6H_{12}O_6$ + H_2O (6)

Chapter 7: Cellular Structure and Function

I. History of Cell Theory
   A. Robert Hooke - made his own microscope to observe cells
      1. Observed cork (dead cells) of oak bark and pronounced the small "box-like" rooms as cells, after cells in a monastery that monks live in
      2. Cells are the basic structural / functional unit of life
   B. Anton Von Leeuwenhoek - designed a microscope and observed cells of pond scum, milk, and other substances
   C. Cell Theory
      1. Matthias Schleiden - studied plant tissues and concluded all plants are composed of cells

2. Theodor Schwann - concluded that animal tissues were made of cells
3. Rudolph Virchow - proposed all cells come from existing cells
   a. These 3 scientists combined to form the cell theory
4. 3 parts of Cell Theory
   a. All living things are made of one or more cells
   b. cells are the basic unit of life
   c. cells come from existing cells

II Microsope Technology - made discovery of cell theory possible
A. Compound Light Microscopes.
   1. consists of a series of glass lenses + uses visible light to magnify images
B. Electron Microscopes - developed during 1940s
   1. Uses magnets to aim a beam of electrons at thin slices of cells
      a. Three kinds: Scanning electron microscope (SEM), transmission electron microscope (TEM), and atomic force microscope (AFM)

III Basic Cell Types
A. Different types of cells, but all cells have a plasma membrane
   1. a special boundary that regulates what enters and leaves the cell

B. Two types
   1. Eukaryotic cells
      a. have organelles; structures w/ specialized functions
      b. have DNA in nucleus, the control center of cell
   2. Prokaryotes - no nucleus or membrane-bound organelles

IV Origin of Cell Diversity
A. the distinct functions of eukaryotic cell organelles has led to cell diversity

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- What is DNA?
- Do prokaryotes have DNA?
- What are the 3 parts of Cell theory?

Biology 7.1

Grade: 10th
Subject: Biology
Date:

1 Which is not part of cell theory?

A the basic unit of life is the cell
B cells came from preexisting cells
C all living things are composed of cells
D cells contain membrane-bound organelles

2 The cell membrane is a structure that surrounds a cell and helps control what enters and exits the cell.

3 A(n) euk. cell has membrane-bound organelles.

4 cells are basic units of all organisms.

5 If a microscope has a series of three lenses that magnify individually 5x, 5x, and 7x, what is the total magnification of the microscope?

A 25x
B 35x
C 17x
D 175x

6 Microscopes have been used by scientists as tools for scientific study since the late 1700s.

1600s

True
False

7.2 The Plasma Membrane

→ Main idea: the plasma membrane helps to maintain a cell's homeostasis

I. Function of the Plasma Membrane

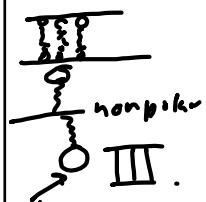
A. Plasma Membranes are essential for a cell to maintain homeostasis

1. All prokaryotic + eukaryotic cells have a plasma membrane
2. A key property of the plasma membrane is selective permeability
   a. allows some substances to pass through while keeping others out
3. How many substances enter/leave the cell relies on the structure of the plasma membrane

II. Structure of the Plasma Membrane

A. Plasma membrane is composed of a phospholipid bilayer

1. Two layers of phospholipids arranged tail to tail
   a. arrange themselves in a way that the plasma membrane can exist in a watery environment



III. Phospholipid bilayer

A. Phospholipids = a molecule that has a glycerol backbone, two fatty acid chains, and a phosphate-containing group

1. Bilayer structure is critical for the formation and function of the plasma membrane
   a. arranged in such a way that the polar heads can be closest to the water molecules and the nonpolar tails can be farthest away from water molecules
   b. causes the middle of plasma membrane to be non polar and keep H_2O out

B. Other components of plasma membrane
1. Cholesterol, proteins, and carbohydrates move with and along phospholipid bilayer
2. Proteins span entire membrane and creates tunnels through which certain substances pass
   a. known as transport proteins, which move materials + wastes through membrane
      → Study Figure 10 (p.379)

C. Fluid Mosaic Model
1. Phospholipids can move sideways within membrane
2. Proteins move among phospholipids
   a. different substances are in constant motion and create a pattern, or mosaic on surface of membrane

7.2 Review

Grade: 10th

Subject: Biology

Date:

1 A key property of the plasma membrane, the ability to allow some substances to pass through while keeping others out is known as ~~reactive permeation~~ selective permeability.

True

False

2 The plasma membrane is composed as a bilayer of Phospholipids arranged tail to tail.

3 Proteins that span the entire membrane and that create tunnels through which certain substances enter and leave cell are transport proteins.

4 The model that refers to a plasma membrane with substances that can move around within the membrane is the _____ model.

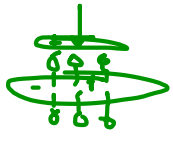
A Dynamic permeation
B Fluid Mosaic
C Shifting Protein

5 The components of a plasma membrane are in constant motion, sliding past one another.

True
False

6 The inside area of a plasma membrane is a polar region.

True
False



Unit Cell Structure

Keywords	Notes
Cytoplasm	→ semifluid in cell within p. membrane → prokaryotes — all chemical processes occur here → enkaryotes - chemical processes occur in the organelles which sit in the cytoplasm
Cytoskeleton	→ Supporting network of long, thin protein fibers that provide an anchor system for organelles → function in cell movement and cellular activities → made up of substructures called microtubules + microfilaments

Summary: They are the components of the inner cell space that interact with organelles. Rapidly assemble and disassemble and slide past one another, allowing cells to move

Cell Structures

Keyword	Notes
Nucleus	→ cell control center, contains most of the cells DNA → surrounded by a double membrane called the nuclear envelope
Ribosomes	→ organelle that helps manufacture proteins → some float freely in the cytoplasm while some are attached to the Endoplasmic Reticulum (ER) → Rough ER
Nucleolus	→ site within the nucleus where ribosome production occurs
E.R.	→ a membrane system that serves as the site for protein + lipid synthesis → Rough have ribosomes, Smooth E.R does not
Golgi Apparatus	→ flattened sac of membranes, that modifies, packages, and sorts proteins into sacs + vesicles

December 08, 2014

Keyword	Notes
Vacuoles	→ sac used to store food, enzymes, and other materials
Lysosomes	→ "clean-up crew" → vesicles that contain digestive enzymes and they digest food / excess particles
Centrioles	→ group of microtubules, function during cell division
Mitochondria	→ convert fuel particles (food) into usable energy (ATP)
Chloroplasts	→ organelles that capture light energy and make energy via photosynthesis
Cell wall	→ thick rigid, mesh of fibers that surrounds the plasma membrane → only in plants
Cilia	→ short, numerous hair-like projections outside plasma membrane
(Flagellum)	→ longer less numerous than cilia, used for cell movement

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→ What is a cell "organelle"?
a structure in the cell w/ a special job

→ What do the following cell structures do:

Organelles

1) Mitochondria → breaks down sugar → energy
2) Ribosome → makes protein
3) Golgi Complex (Apparatus) → packaging VPS center
4) Nucleus → holds DNA

7.4 Osmosis

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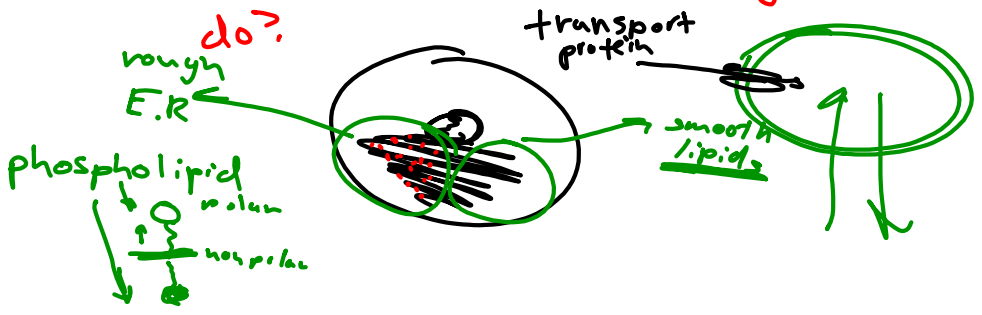
→ Cell theory → What are the 3 parts?

cell = basic unit, All life = 1 or more cells, all cell's → cells,

→ What does the E.R (rough + smooth) do?



Cell Transport

Passive

NO energy

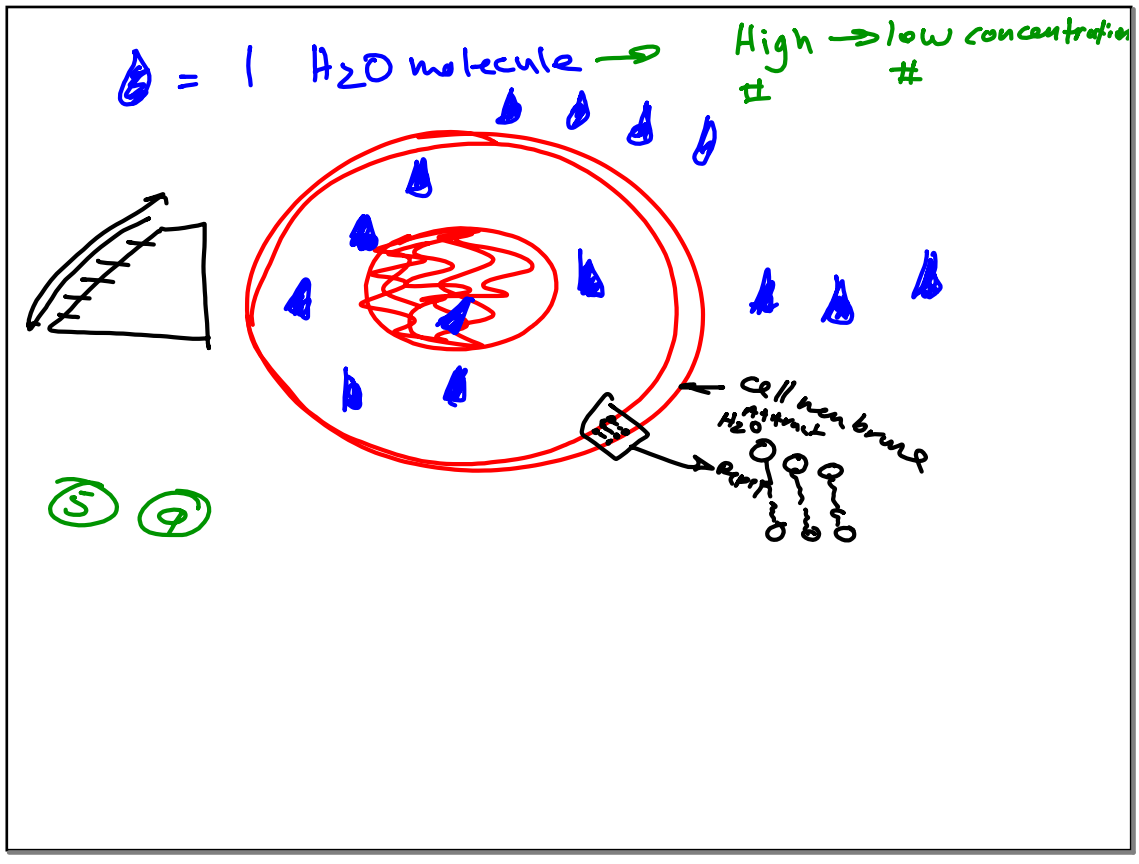
osmosis

facilitated diffusion (transport protein)

With the flow

Active

Energy



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→ What is the difference between active and passive transport?

Na+/K+

Endo + Exocytosis,

Give an example of each.

channel
protein
osmosis
facilitated diffusion
diffusion
H_2O

→ Low → High (Requires Energy); Large Particle

H_2O High → Low (No energy)

H_2O

hypotonic

7.3 Review

Grade: 10th

Subject: Biology

Date:

1 Vacuoles store wastes

2 _____ produces ribosomes

A Golgi apparatus
B Nucleolus
C Mitochondria

3 _____ generates energy for a cell

A Golgi Apparatus
B Endoplasmic Reticulum
C Mitochondria

4 Which structure synthesizes proteins that will be used by the cell?

A chromatin
B nucleolus
C ribosome
D endoplasmic reticulum

5 The golgi apparatus sorts proteins into vesicles.

True
False

6 In which structure would you expect to find a cell wall?

A human skin cell
B cell from an oak tree
C blood cell from a cat
D liver cell from a mouse

7.4 Cellular Transport

→ Cell transport moves substances into and out of the cell

I. Diffusion

A. The amount of a substance is called concentration

B. Substances diffuse from high concentration to low concentration

1. No energy is required for diffusion

C. Particles continuing to move with no change in concentration is dynamic equilibrium

D. There three factors affect rate of diffusion

→ concentration, temp., pressure

→ increase in temp or pressure, high concentration causes rate to increase

E. Diffusion across the plasma membrane

1. Facilitated diffusion uses transport proteins to move ions and small molecules across plas. mem.

★ ⇒ become familiar with Figure 29, p.405

a. substances move through channel protein in facilitad diffusion

2. Diffusion is passive transport

II Osmosis: Diffusion of H_2O across a selectively permeable membrane

A. Osmosis is critical maintaining homeostasis in a cell
1. H_2O molecules diffuse toward the side with highest solute concentration
a. This occurs until dynamic equilibrium is reached

B. Cells in isotonic solution
1. This is where the concentration inside the cell is equal to its surroundings
a. Water enters as fast as it leaves the cell

C. Cells in hypotonic solution
1. This is where the cell has a lower concen. than its surroundings

D. Cells in hypertonic solution
1. Where concentration of solute is higher than inside the cell

III Active Transport - movement of substances across plas. memb. against concentration gradient
→ Requires energy

A. Occurs due to pumps or carrier protein

B. Na/K ATPase pump → See Figure 35,3C (p. 411)
1. Pump uses to pump 3 Na^+ ions out cell and moves 2 K^+ ions into cell

7.4 Review

Grade: 10th

Subject: Biology

Date: [redacted]

1 What describes transport proteins moving molecules across the plasma membrane?

A diffusion
B osmosis
C dynamic equilibrium
D facilitated diffusion

2 Which of these describes continuous particle movement with no change in concentration?

A selective permeability
B facilitated diffusion
C osmosis
D dynamic equilibrium

3 Which of the following is not true of exocytosis?

A results in hormone secretion
B does not require energy input
C allows waste to be expelled
D occurs at plasma membrane

4 Why does misting fruits and vegetables help them look fresh?

A vacuoles fill with water due to osmosis
B plants in hypotonic solution lose water
C plants do not have a rigid cell wall
D water cannot move through the cell membrane

Bellringer

→ What is osmosis? movement of H_2O across a cell membrane

Passive

high → low

→ What is Active transport

→ What is endocytosis, exocytosis?

in out

→ Name the function of the following cell organelles:

1. ~~1)~~ ~~Mitochondria~~ Mitochondria sugar → energy
2) Golgi Apparatus → UPS
3) Smooth ER → lipids
4) Lysosome → digests → suicide
5) Ribosome → protein

Short Story of the Cell

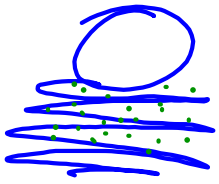
1) Nucleus
2) Rough / Smooth ER
3) Lysosome
4) Mitochondria
5) Ribosome
6) Golgi Apparatus
7) Cell Membrane

} Funny → Names

Bellringer

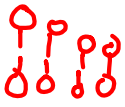
→ What is exocytosis? endocytosis?

→ What is osmosis?



→ What does the nucleolus do? Smooth ER? Rough ER?

→ What makes the cell membrane unique?



Chapter 7 Review

Grade: 10th

Subject: Biology

Date:

1 Which of the following is not a fundamental idea of cell theory?

A all organisms contain prokaryotic cells
B cells are the basic units of the living things
C all cells come from pre-existing cells
D all living organisms are composed of one or more cells

2 A _____ contains polar and nonpolar ends, forming the plasma membrane

phospholipid

3 A eukaryotic cell's genetic material is contained in the _____

Nucleus

4 In which cell structure are ribosomes produced?

A microtubules
B nucleolus
C plasma membrane
D golgi apparatus

5 The semifluid inside the cell membrane is called the _____

Cytoplasm

6 Vesicles that digest worn-out organelles or food particles are called _____.

A lysosomes
B ribosomes
C centrioles
D plasma membranes

7 What critical function does cholesterol serve the body?

A destroys the plasma membrane
B binds fatty acid tails to water
C disrupts homeostasis
D increases fluidity of plasma membrane

8 What describes transport proteins moving molecules across the plasma membrane?

A diffusion
B osmosis
C facillitated diffusion
D dynamic equilibrium

9 What effect has eukaryotic evolution had on cells?

A more simplified structures
B greater adaptibility
C elminated organelles
D descreased cell diversity

10 What is one significant disadvantage of scanning and transmission electron microscopes?

A cells cannot absorb electrons
B not as powerful as light microscopes
C cells die when prepared for viewing
D cannot observe plant cells

11 What is the function of a selectively permeable membrane?

A provides alternative to phospholipid bilayer
B prevents transport proteins from harming the cell
C controls what enters and leaves the cell
D blocks all water from entering the cell

12 What moves needed substances or waste materials through the plasma membrane?

Transport proteins

13 Which of the following is not a function of the Golgi Apparatus?

A modifies proteins
B produces proteins
C organizes where proteins are sent
D packages proteins into vesicles

14 Which of the following is not true of exocytosis?

A results in hormone secretion
B does not require energy input
C allows waste matter to be expelled
D occurs at plasma membrane

15 Which of these describes continuous particle movement with no overall change in concentration?

A selective permeability
B osmosis
C facilitated diffusion
D dynamic equilibrium

16 Vacuoles stores wastes

17 Which type of transport requires energy input from the cell?

A active transport
B facilitated diffusion
C osmosis
D simple diffusion

18 _____ generates energy for the cell

Mitochondria

19 _____ produces ribosomes

Nucleolus